"To care for him who shall have borne the battle and for his widow and his orphan."

Abraham Lincoln,
Second Inaugural Address

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BioMedical Engineering

VA National Center for Patient Safety

BioMedical Engineering

Biomedical engineers apply the fundamentals of mathematics, physics, chemistry, biology and engineering to solve medically relevant problems. Examples of biomedical engineering activities include medical device design, specification, fabrication, and testing.

Biomedical engineers often work side by side with clinical engineers — professionals who support and advance patient care by applying engineering and managerial skills to healthcare technology.

NCPS uses biomedical and clinical engineering principles and techniques to support the safe use of medical devices at VA facilities.

Contributions from these engineers are critical to two aspects of this effort. First, in a *prospective* risk assessment, engineers provide consultations during the process of procuring and acquiring a medical device to members of the VA clinical staff, such as doctors, nurses, therapists and technicians. Secondly, engineers contribute by investigating, defining and solving problems and improving processes associated with devices as part of *retrospective* risk assessment initiatives.

Not all devices reviewed are complex or sophisticated. Some can be simple medical devices, such as a "pipette," which can be used as an oral syringe to administer liquid medications.

After such a pipette was involved in a close call that concerned dosage, a retrospective risk assessment was conducted. The scale on the device in question was read in the opposite manner as a standard syringe, causing confusion over correct dosages. The assessment led to replacing the pipettes with safer, easier to read devices. A second alternative was to replace the liquid dosage with unit dose pills, eliminating liquid all together.

As an example of a prospective risk assessment on a complex medical device, biomedical and clinical engineers conducted a review of a deep brain stimulator prior to its use at VA facilities. These devices help prevent people with Parkinson's disease from shaking.

The engineers determined that patients with such implants should be identified in the VA's Computerized Patient Records System to insure that "contraindicated modalities" are not allowed to be used on them. A contraindicated modality is a medical term for a procedure, like ultrasound, which can cause an implant to heat, resulting in brain damage.

Because of this risk assessment, the potential harm contraindicated modalities can cause patients was noted in clinical practice recommendations. Specific use was also recorded on a patient's computerized record, which is referred to routinely by medical staff at all levels.

Placing such information on a computerized record is particularly important to a patient's welfare: Clinical staff are prevented from admitting, scheduling or treating a patient without getting approval from the physician who implanted the device. Known as a "forcing function," this technique creates "a time out" to reduce the risk that a patient may be harmed inadvertently as a result of their care, a key NCPS goal.

For more information, visit the American College of Clinical Engineering Web site: *www.accenet.org*.